

WHAT IS CLAIMED IS:

1. A curable composition that is controllably curable by microwave energy
comprising:

- 5 a) at least one heat curable resin component;
- b) microwave absorbable particles in an amount of about 10% by weight of said
composition; and
- c) at least one curing agent for said heat curable resin component.

10 2. A composition according to claim 1 wherein said microwave absorbable particles
are in an amount sufficient to uniformly cure said composition.

 3. A composition according to claim 1 wherein said microwave absorbable particles
are in an amount of at least about 10% to about 40% by weight of said composition.

15 4. A composition according to claim 1 wherein said microwave absorbable particles
are selected so that the Curie temperature of said particles is higher than the curing temperature
of said heat curable resin component.

20 5. A composition according to claim 1 wherein said microwave absorbable particles
comprise a ferromagnetic compound.

 6. A composition according to claim 1 wherein said microwave absorbable particles
are selected from the group consisting of ferrite, amorphous carbon, carbon black, graphite and
combinations thereof.

25 7. A composition according to claim 1 wherein said curable resin component is
selected from the group consisting of acrylics, elastomeric synthetic rubbers, epoxies,
polyesters, polyurethanes, polybutadienes, cyanate esters, bismoleimides, polyimides,
phenolics, silicones, acrylic silicones, epoxy silicones and copolymers and combinations
30 thereof.

8. A composition according to claim 1 wherein said heat curable resin is an elastomeric composition.

9. A composition according to claim 1 wherein said heat curable resin is a heat curable silicone.

10. A composition according to claim 1 wherein said curing agent is an addition curing catalyst.

11. A composition according to claim 1 wherein said curing agent is selected from the group consisting of an amine-containing compound, an azo compound and a peroxide curing agent.

12. A composition according to claim 11 wherein said peroxide curing agent is selected from the group consisting of cumemhydroperoxide, methylethylketone hydroperoxide, percarbonates, diacyl peroxides, per-esters, per-acids and combinations thereof.

13. The composition accordingly to claim 1, further including a material selected from the group consisting of inhibitors, viscosity modifying agents, catalysts, coloring agents, fluorescent agents, and combinations thereof.

14. The compositions according to claim 13 wherein said viscosity modifying agent is selected from the group consisting of fumed silica, precipitated silica, titanium dioxide, lithopone, zinc oxide, zirconium silicate, silica aerogel, iron oxide, diatomaceous earth, calcium carbonate, silazane treated silicas, glass fibers, magnesium oxide, chromic oxide, zirconium oxide, aluminum oxide, alpha quartz, calcined clay, carbon, graphite, cork, cotton, synthetic fibers and combinations thereof.

15. The composition according to claim 13 wherein said viscosity modifying agent is in an amount from about 0.1 % to about 60 % of the total composition.

16. The compositions according to claim 13 wherein said catalyst comprises a platinum catalyst complex.

17. The compositions according to claim 13 wherein said catalyst is an amount from about 0.02 % to about 10.00 % of the total composition.

18. The compositions according to claim 13 wherein said inhibitor is selected from the group consisting of methylvinyl cyclotetrasiloxane, trialkylcyanurates, alkylmaleates and combinations thereof.

19. The compositions according to claim 13 wherein said inhibitor is selected from the group consisting of hexamethyldisilazane, amines, α - hydroxyacetylene and combinations thereof.

20. The composition according to claim 1 wherein said heat curable resin component is selected from the group consisting of monomers, oligomers, polymers and combinations thereof.

21. A method of controllably curing a composition comprising:

- a) selecting microwave absorbable particles having a desired Curie temperature;
- b) combining said microwave absorbable particles with a curing agent and a heat curable resin component which has a curing temperature lower than said Curie temperature, said resin being substantially transparent to microwave energy such that said particles being present in an amount of about 10% by weight of said composition; and
- c) applying a sufficient amount and wavelength of microwave energy to said composition to achieve the desired heating temperature.

22. A method according to claim 21 wherein said microwave absorbable particles are dispersed in an amount sufficient to cure said composition.

23. A method according to claim 21 wherein said composition is cured.

24. A method according to claim 21 wherein said microwave absorbable particles are dispersed only within selected portions of said heat curable resin component such that only said selected portions melt when said compositions are exposed to microwave energy.

5 25. A method according to claim 21 wherein the microwave absorbable particle comprises a ferromagnetic compound.

26. A method according to claim 21 wherein the microwave absorbable particle are selected from the group consisting of ferrite, amorphous carbon, carbon black, graphite and combinations thereof.
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27. A method according to claim 21 wherein said heat curable resin component is selected from the group consisting of acrylics, epoxies, polyesters, polyurethanes, polybutadienes, cyanate esters, bismoleimides, polyimides, phenolics, silicones and combinations thereof.
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28. A method according to claim 21 wherein said heat curable resin component is selected from the group consisting of monomers, oligomers, polymers and combinations thereof.
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29. A method according to claim 21 wherein said microwave energy is in a range from about 10KHz to about 100 GHz.

30. A method according to claim 21 further comprising the step of applying said heat curable resin component between two members to be joined and wherein the application of microwave energy melts said composition and joins said members.
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